

PATENT COOPERATION TREATY

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NOTIFICATION CONCERNING
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To:

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Applicant

WASHINGTON STATE UNIVERSITY RESEARCH FOUNDATION et al

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For two-letter codes and other abbreviations, refer to the "Guid-
ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.

(54) Title: SUPPRESSION OF FOLIAR AND SOILBORNE PATHOGENS

(57) Abstract: Disclosed herein is a method for increasing the production of crops, particularly wheat and soybean, using herbicide resistant cultivars. In one aspect of this method, the method increases crop yield by diminishing the impact of the root diseases caused by *Gaeumannomyces* and *Rhizoctonia* species by treating the crop with an herbicide, in particular glyphosate. In another aspect the method for treating crops reduces the effects foliar pathogens and diseases, particularly fungal pathogens, such as rusts, including soybean rust, stem rust, stripe rust and leaf rust.



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AMENDED CLAIMS

[received by the International Bureau on 25 May 2005 (25.05.05);
original claims 22-25B are replaced by amended claims 26-30; claim 1 has been amended;

We claim:

1. A method for reducing disease on a crop infected with at least one pathogen, comprising:
5 providing an herbicide resistant crop; and
treating the crop with glyphosate, thereby reducing the effects of the pathogen on the crop.
2. The method according to claim 1, wherein the crop is selected from
10 glyphosate resistant soybeans and glyphosate resistant wheat.
3. The method according to claim 1 or 2, wherein treating the crop comprises at least two separate applications of glyphosate.
- 15 4. The method according to claim 3, wherein the more than two separate applications of glyphosate are applied at least about seven days apart.
5. The method according to claim 1 or 2, wherein treating the crop comprises treating the crop with from greater than about 1.0 kg/ha to about 3.0 kg/ha
20 of glyphosate.
6. The method according to claim 1 or 2, wherein treating the crop comprises treating the crop with from greater than about 1.0 kg/ha to about 2.0 kg/ha
25 of glyphosate.
7. The method according to claim 1 or 2, wherein treating the crop comprises treating the crop with from about 1.5 kg/ha to about 2.0 kg/ha of glyphosate.
- 30 8. The method of claim 5, wherein treating the crop with glyphosate comprises at least two separate applications of glyphosate.

9. The method of claim 1 or 2, wherein the pathogen is a fungal pathogen.
10. The method of claim 1 or 2, wherein the pathogen is a foliar pathogen.
11. The method of claim 1 or 2, wherein the pathogen is a species of *Rhizoctonia*, *Gaeumannomyces*, *Phakopsora* or *Puccinia*.
12. The method of claim 1 or 2, wherein the pathogen is *Phakopsora pachyrhizi*.
13. The method of claim 12, wherein the crop is glyphosate resistant soybean.
14. The method of claim 1 or 2, wherein the crop is glyphosate resistant wheat.
15. The method of claim 1 or 2, wherein the yield is from about 5% to about 20% higher than a crop not treated with glyphosate.
16. The method of claim 1 or 2, wherein the crop is glyphosate resistant wheat and the crop is treated with glyphosate at a stage between the 3 leaf stage and the flowering stage.
17. The method of claim 1 or 2, wherein the crop is glyphosate resistant soybean and the soybeans and the crop is treated between emergence and the flowering stage.
18. The method of claim 1 or 2, wherein treating the crop with glyphosate comprises treating the crop with glyphosate prior to the display of a symptom of pathogen presence.

19. The method of claim 1 or 2, further comprising harvesting the crop thereby yielding a harvested crop.

5 20. A harvested crop produced by the method of claim 19.

21. A method for reducing disease on a wheat crop with at least one pathogen, comprising:

10 providing an herbicide resistant wheat crop; and
treating the wheat crop with an herbicide after emergence of the herbicide resistant wheat crop, thereby reducing the effects of the pathogen on the wheat crop.

22. The method according to claim 21, wherein the herbicide resistant wheat crop is glyphosate resistant.

15 23. The method according to claim 21, further comprising treating the wheat crop prior to emergence.

20 24. The method according to claim 21, wherein the herbicide is glyphosate.

25 25. The method according to claim 21, wherein the herbicide is a 5-enolpyruvylshikimate-3-phosphate synthase inhibitor.

26. The method according to claim 21, wherein the pathogen is a soilborne pathogen.

27. The method according to claim 21, wherein the pathogen is a fungal pathogen.

30 28. The method according to claim 21, wherein the pathogen is a species of *Rhizoctonia*, *Gaeumannomyces*, *Phakopsora* or *Puccinia*.

29. The method according to claim 28, wherein the pathogen is *Gaeumannomyces graminis var tritici*.

5 30. The method according to claim 21, wherein the pathogen is a foliar pathogen.

31. The method according to claim 21, wherein the pathogen causes stripe rust, stem rust or leaf rust.

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32. The method according to claim 31, wherein the pathogen is *Puccinia striiformis*.

33. The method according to claim 21, wherein pathogen activity is decreased for at least 21 days after herbicide application.

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34. The method of claim 22, wherein the glyphosate resistant wheat crop is treated with from about 0.5 kg/ha to about 2.0 kg/ha glyphosate, thereby increasing the yield of the wheat, wherein the yield is at least about 5% higher than a glyphosate sensitive wheat crop.

20

35. The method according to claim 21, wherein glyphosate is applied at a density of from about 0.5 kg/ha to about 1.5 kg/ha.

25 36. The method according to claim 21, wherein glyphosate is applied at a density of from about 0.5 kg/ha to about 1.0 kg/ha.

37. The method according to claim 34, wherein the yield is from about 5% to about 20% higher.

30

38. The method according to claim 1 or 2, wherein the at least one pathogen is a rust.

39. The method according to claim 38, wherein the rust is selected from the group consisting of stem rust, stripe rust, leaf rust and soybean rust.

5 40. The method according to claim 1 or 2, wherein treating the crop comprises treating the crop with glyphosate at a density of greater than about 1.0 kg/ha of glyphosate

10 41. A method for reducing disease on a crop infected with at least one pathogen, comprising:

providing an herbicide resistant crop, wherein the crop is selected from glyphosate resistant wheat and glyphosate resistant soybeans;

treating the crop with glyphosate at a density of greater than about 1.0 kg/ha of glyphosate, thereby reducing the effects of the pathogen on the crop.

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PATENT COOPERATION TREATY

PCT/US2004/035807

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From the INTERNATIONAL BUREAU

**NOTIFICATION CONCERNING
THE FILING OF AMENDMENTS OF THE CLAIMS**
(PCT Administrative Instructions, Section 417)

To:

YOUNG, Travis
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One World Trade Center, Suite 1600
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United States of America

Date of mailing
(day/month/year) 18 July 2005 (18.07.2005)

Applicant's or agent's file reference
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Applicant

WASHINGTON STATE UNIVERSITY RESEARCH FOUNDATION et al

1. The applicant is hereby notified that amendments to the claims under Article 19 were received by the International Bureau on:

25 May 2005 (25.05.2005)

2. This date is within the time limit under Rule 46.1.

Consequently, the international publication of the international application will contain the amended claims according to Rule 48.2(f), (h) and (i).

3. The applicant is reminded that the international application (description, claims and drawings) may be amended during the international preliminary examination under Chapter II, according to Article 34, and in any case, before each of the designated Offices, according to Article 28 and Rule 52, or before each of the elected Offices, according to Article 41 and Rule 78.

The International Bureau of WIPO
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Authorised officer

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IN THE INTERNATIONAL BUREAU OF WIPO

PATENT COOPERATION TREATY
International Bureau

In re International Application of: WASHINGTON STATE UNIVERSITY RESEARCH
FOUNDATION *et al.*

International Application No.: PCT/US2004/035807

International Filing Date: 27 October 2004 (27.10.2004)

For: SUPPRESSION OF FOLIAR AND SOILBORNE PATHOGENS

Date: May 25, 2005

THE INTERNATIONAL BUREAU OF WIPO
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LETTER ACCOMPANYING CLAIM AMENDMENTS UNDER ARTICLE 19

Dear Sir or Madam:

Submitted herewith are substitute claims under Article 19. Please replace pages 22 to 25 of the international application with the attached replacement pages 22, 23, 24, 25A and 25B. Replacement claims 1 through 41 are submitted herewith, and correspond to original claims 1 through 36 as follows:

- * Claim 1 has been amended;
- * New Claim 2 has been added; it is directed to subject matter partitioned out of Claim 1, and is supported thereby;
- * Claims 2 through 36 have been renumbered to Claims 3 through 37, and to include (in some instances) dependencies from both Claims 1 and 2;
- * New Claims 38 through 41 have been added. The language of Claims 38 and 39 is supported in the specification, for instance at page 5, lines 12-14. Claim 40 is directed to subject matter partitioned out of original Claim 1, and is supported thereby. New Claim 41 corresponds to original Claim 1.

The changes introduced herein by this amendment do not go beyond the scope of the original filing. Please telephone the undersigned at the telephone number listed below if anything further is required.

Respectfully submitted,

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We claim:

1. A method for reducing disease on a crop infected with at least one pathogen, comprising:
5 providing an herbicide resistant crop; and
treating the crop with glyphosate, thereby reducing the effects of the pathogen on the crop.
2. The method according to claim 1, wherein the crop is selected from
10 glyphosate resistant soybeans and glyphosate resistant wheat.
3. The method according to claim 1 or 2, wherein treating the crop comprises at least two separate applications of glyphosate.
- 15 4. The method according to claim 3, wherein the more than two separate applications of glyphosate are applied at least about seven days apart.
5. The method according to claim 1 or 2, wherein treating the crop comprises treating the crop with from greater than about 1.0 kg/ha to about 3.0 kg/ha
20 of glyphosate.
6. The method according to claim 1 or 2, wherein treating the crop comprises treating the crop with from greater than about 1.0 kg/ha to about 2.0 kg/ha of glyphosate.
25
7. The method according to claim 1 or 2, wherein treating the crop comprises treating the crop with from about 1.5 kg/ha to about 2.0 kg/ha of glyphosate.
- 30 8. The method of claim 5, wherein treating the crop with glyphosate comprises at least two separate applications of glyphosate.

9. The method of claim 1 or 2, wherein the pathogen is a fungal pathogen.
10. The method of claim 1 or 2, wherein the pathogen is a foliar pathogen.
11. The method of claim 1 or 2, wherein the pathogen is a species of *Rhizoctonia*, *Gaeumannomyces*, *Phakopsora* or *Puccinia*.
12. The method of claim 1 or 2, wherein the pathogen is *Phakopsora pachyrhizi*.
13. The method of claim 12, wherein the crop is glyphosate resistant soybean.
14. The method of claim 1 or 2, wherein the crop is glyphosate resistant wheat.
15. The method of claim 1 or 2, wherein the yield is from about 5% to about 20% higher than a crop not treated with glyphosate.
16. The method of claim 1 or 2, wherein the crop is glyphosate resistant wheat and the crop is treated with glyphosate at a stage between the 3 leaf stage and the flowering stage.
17. The method of claim 1 or 2, wherein the crop is glyphosate resistant soybean and the soybeans and the crop is treated between emergence and the flowering stage.
18. The method of claim 1 or 2, wherein treating the crop with glyphosate comprises treating the crop with glyphosate prior to the display of a symptom of pathogen presence.

19. The method of claim 1 or 2, further comprising harvesting the crop thereby yielding a harvested crop.

5 20. A harvested crop produced by the method of claim 19.

21. A method for reducing disease on a wheat crop with at least one pathogen, comprising:

10 providing an herbicide resistant wheat crop; and
treating the wheat crop with an herbicide after emergence of the herbicide resistant wheat crop, thereby reducing the effects of the pathogen on the wheat crop.

22. The method according to claim 21, wherein the herbicide resistant wheat crop is glyphosate resistant.

15 23. The method according to claim 21, further comprising treating the wheat crop prior to emergence.

20 24. The method according to claim 21, wherein the herbicide is glyphosate.

25 25. The method according to claim 21, wherein the herbicide is a 5-enolpyruvylshikimate-3-phosphate synthase inhibitor.

26. The method according to claim 21, wherein the pathogen is a soilborne pathogen.

27. The method according to claim 21, wherein the pathogen is a fungal pathogen.

30 28. The method according to claim 21, wherein the pathogen is a species of *Rhizoctonia*, *Gaeumannomyces*, *Phakopsora* or *Puccinia*.

29. The method according to claim 28, wherein the pathogen is *Gaeumannomyces graminis var tritici*.

5 30. The method according to claim 21, wherein the pathogen is a foliar pathogen.

31. The method according to claim 21, wherein the pathogen causes stripe rust, stem rust or leaf rust.

10 32. The method according to claim 31, wherein the pathogen is *Puccinia striiformis*.

33. The method according to claim 21, wherein pathogen activity is decreased for at least 21 days after herbicide application.

34. The method of claim 22, wherein the glyphosate resistant wheat crop is treated with from about 0.5 kg/ha to about 2.0 kg/ha glyphosate, thereby increasing the yield of the wheat, wherein the yield is at least about 5% higher than a glyphosate sensitive wheat crop.

35. The method according to claim 21, wherein glyphosate is applied at a density of from about 0.5 kg/ha to about 1.5 kg/ha.

25 36. The method according to claim 21, wherein glyphosate is applied at a density of from about 0.5 kg/ha to about 1.0 kg/ha.

37. The method according to claim 34, wherein the yield is from about 5% to about 20% higher.

30 38. The method according to claim 1 or 2, wherein the at least one pathogen is a rust.

39. The method according to claim 38, wherein the rust is selected from the group consisting of stem rust, stripe rust, leaf rust and soybean rust.

5 40. The method according to claim 1 or 2, wherein treating the crop comprises treating the crop with glyphosate at a density of greater than about 1.0 kg/ha of glyphosate

10 41. A method for reducing disease on a crop infected with at least one pathogen, comprising:
 providing an herbicide resistant crop, wherein the crop is selected from glyphosate resistant wheat and glyphosate resistant soybeans;
 treating the crop with glyphosate at a density of greater than about 1.0 kg/ha of glyphosate, thereby reducing the effects of the pathogen on the crop.